Experiences on Inventory and management of wild mushrooms within the EMI"

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Policy Forum "Untapping the potential of non-wood forest products for Europe's green economy"

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CENTRO DE INVESTIGACIÓN Y TECNOLOGÍA AGROALIMENTARIA DE ARAGÓN

emi
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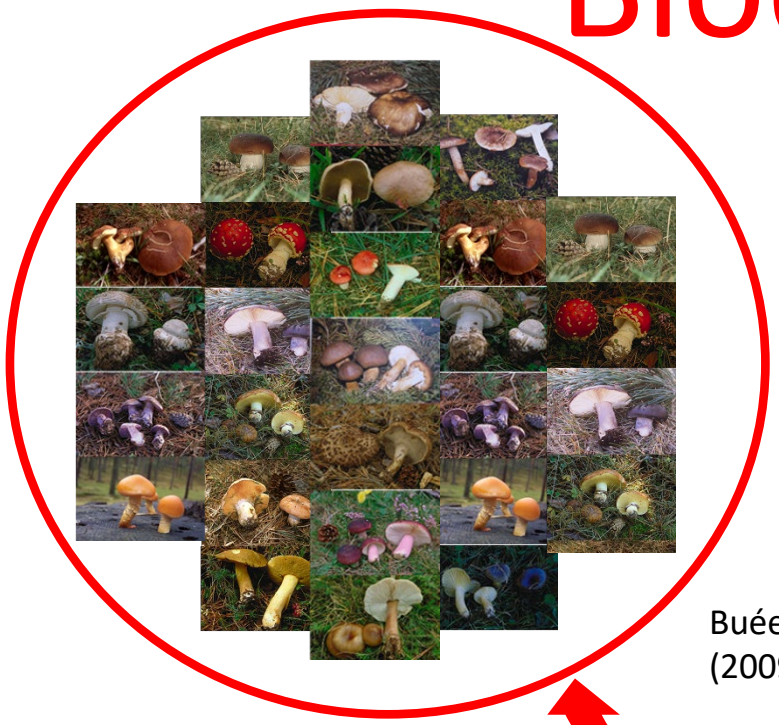
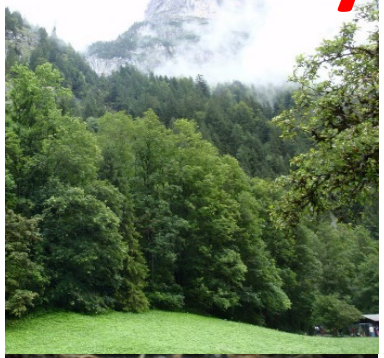
My name is Fernando Martinez Peña researcher on Forest Mycology and Truficulture at the Agri-Food and Technology Research Centre of Aragon (CITA) and Director of the European Mycological Institute (EMI). Many thanks to the organizers for inviting me in this forum. I will try to justify the convenience of inventorying and managing wild edible mushrooms and some experiences carried out by the EMI.

Biodiversity





above ground

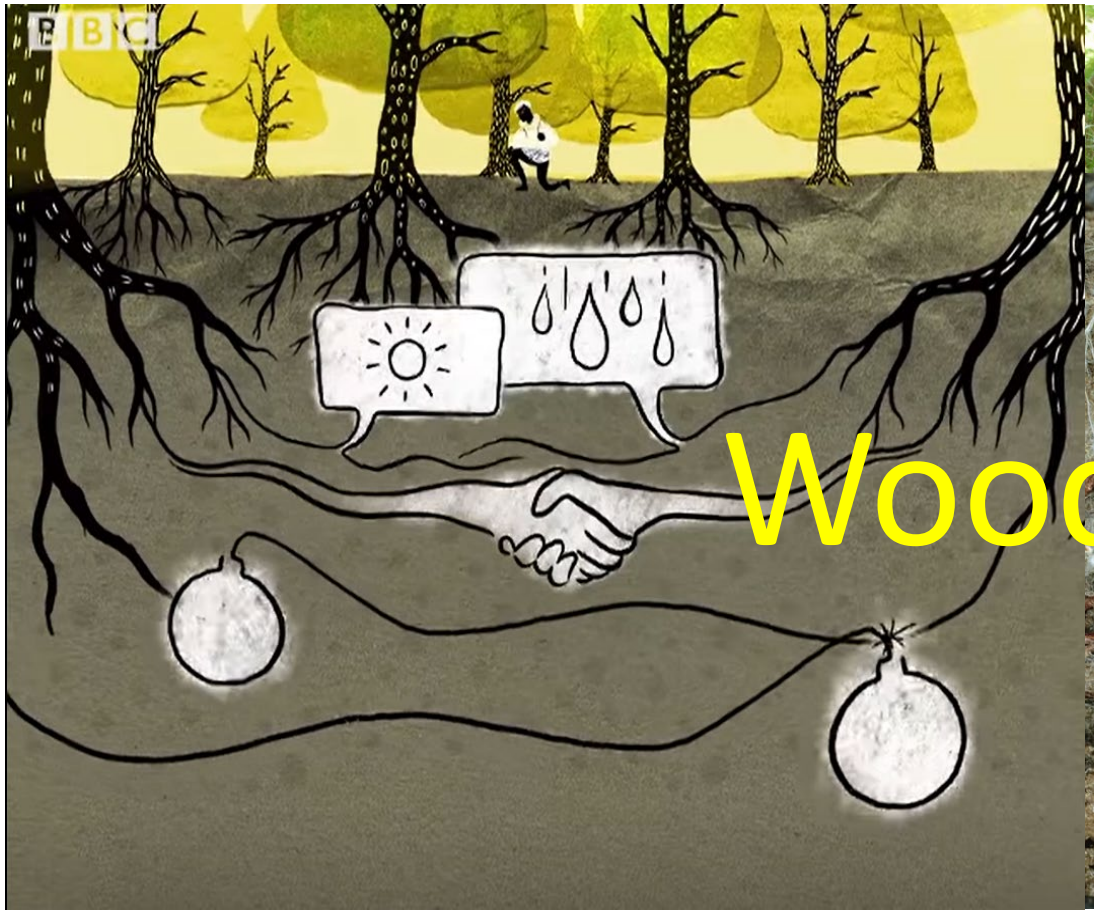
below ground

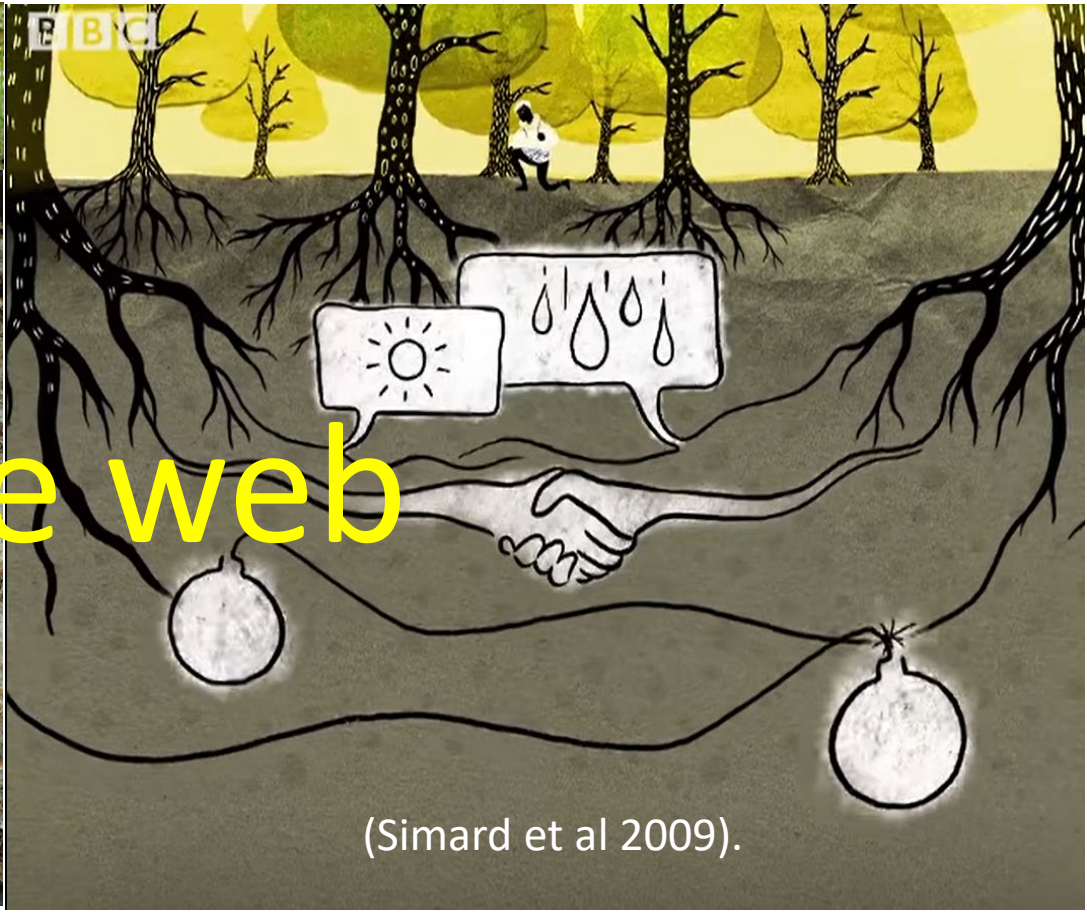
Buée et al. (2009)

Organism group	Number of species - Europe	Reference
Fungi	>75 000	Senn-Irlet et al. 2007
Macrofungi	>15 000	Senn-Irlet et al. 2007
Vascular plants	12 500	Planta Europa
Molsses	1 753	Porley et al. 2007. Proceedings to the World Conference on Bryology 2007
Butterflies	8 470	Karsholt & Razowski 1996. The Lepidoptera of Europe, A distributional checklist
Birds	524	www.birdlife.org
Mammals	226	http//ec.europa.eu/environment/nature/conservation/species/ema/index.htm

First at all, fungi provide a large part of forest biodiversity and, as a consequence, fungi contribute to improve forest resilience. In Europe, more than 15,000 species of macrofungi have been catalogued. Just as an example, up to 400 fungal species have been described only in 6 grams of forest soil.

Wood wide web





All this amazing fungal diversity below ground, forms the so-called wood wide web. This network allows the transfer of water and nutrients between different trees and also allows communication in the face of events such as the arrival of pests or water stress. This wood wide web makes forest more resilient.

Mushroom collecting legislation
Without them

Rural development

But in addition, mushrooms have been a source of rural development in many forest areas. We use more than 260 species in Europe for commercial purposes. Recreational use and self-consumption is more widespread in richer countries while commercial use prevails in less developed economies. Fifty percent of the countries have some kind of collecting legislation.

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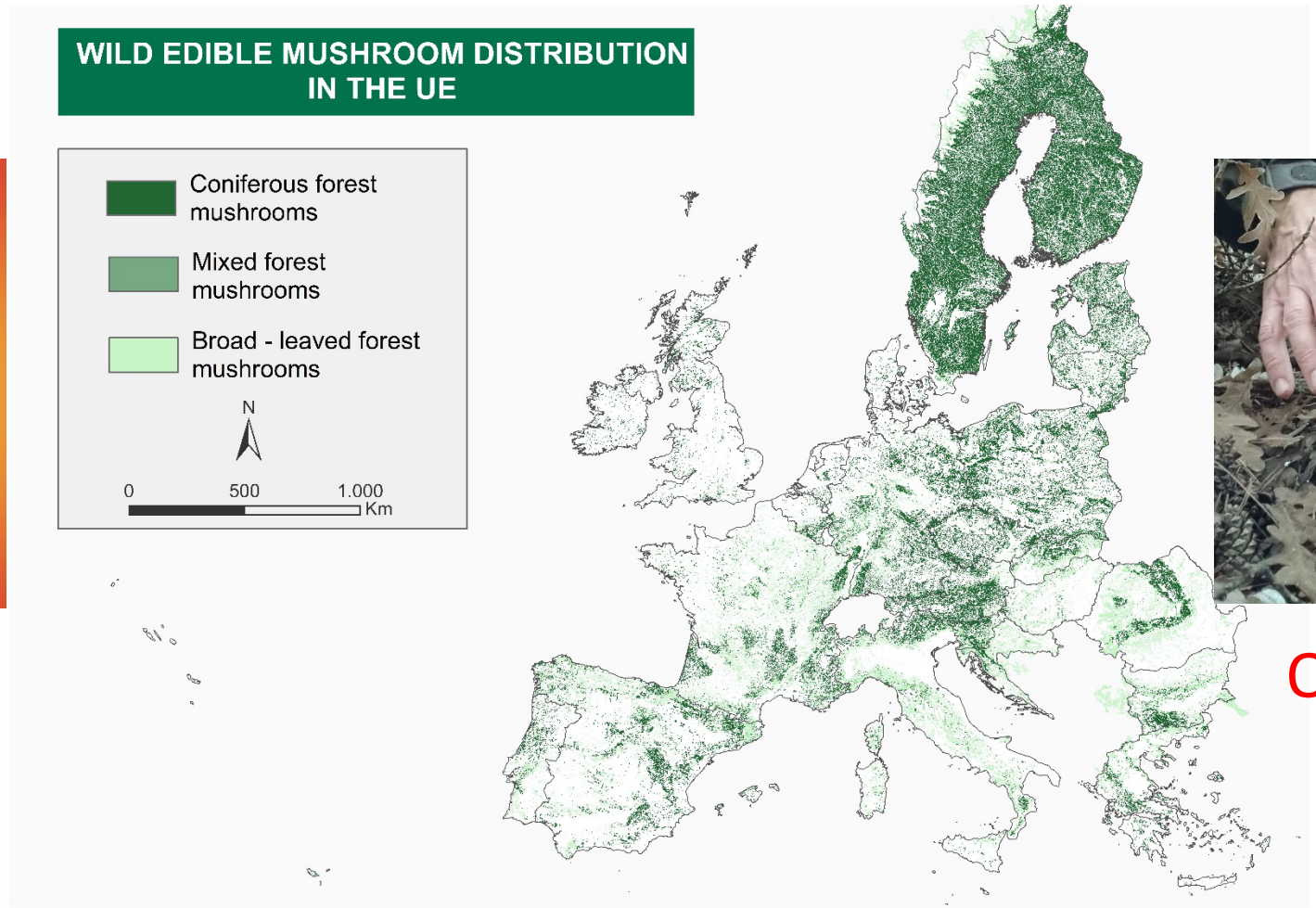

Overharvesting?

Despite the high potential of wild edible mushrooms in Europe, there are two main threats which may condition production and diversity in the future: one is global change and the other one overharvesting.

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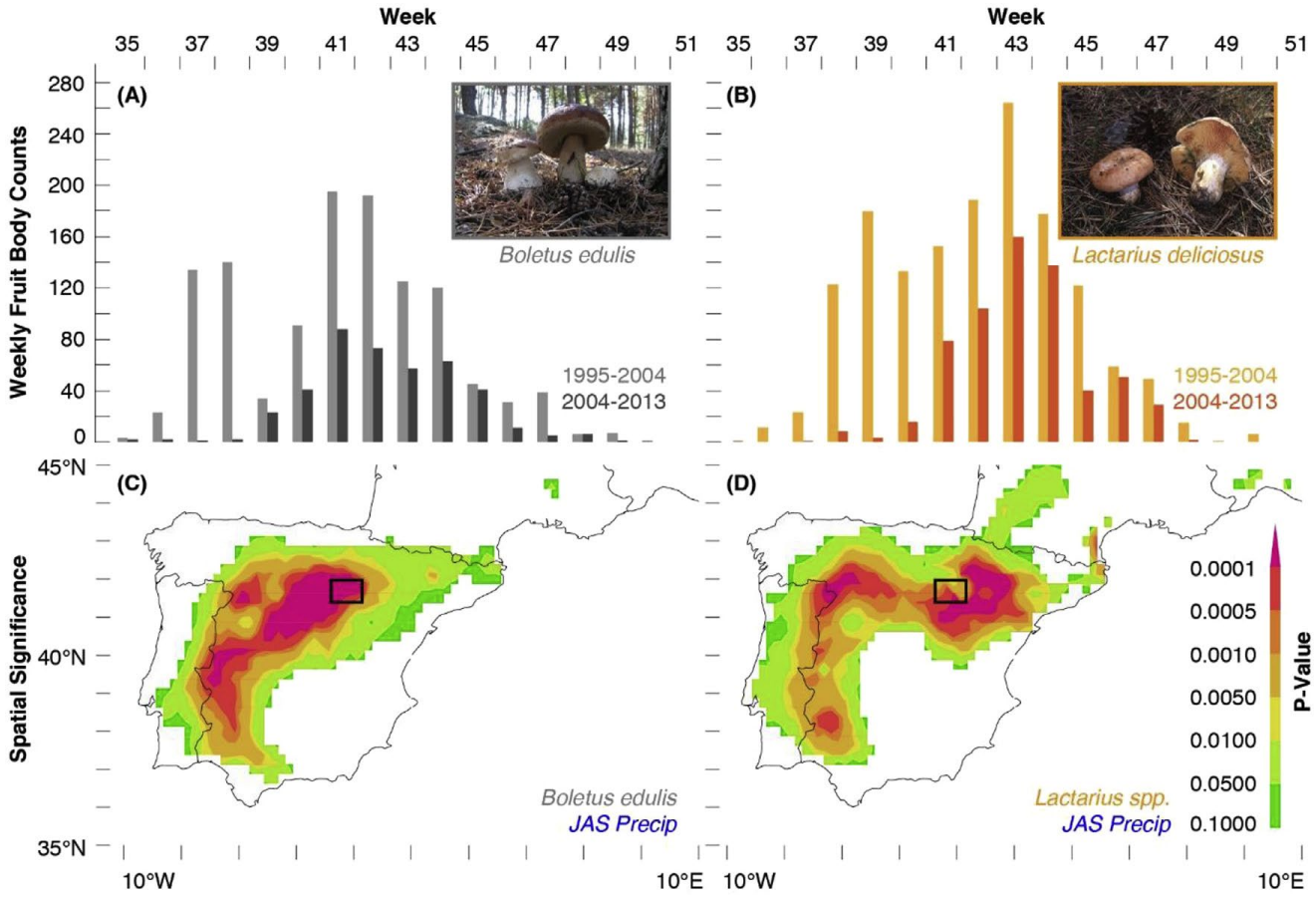
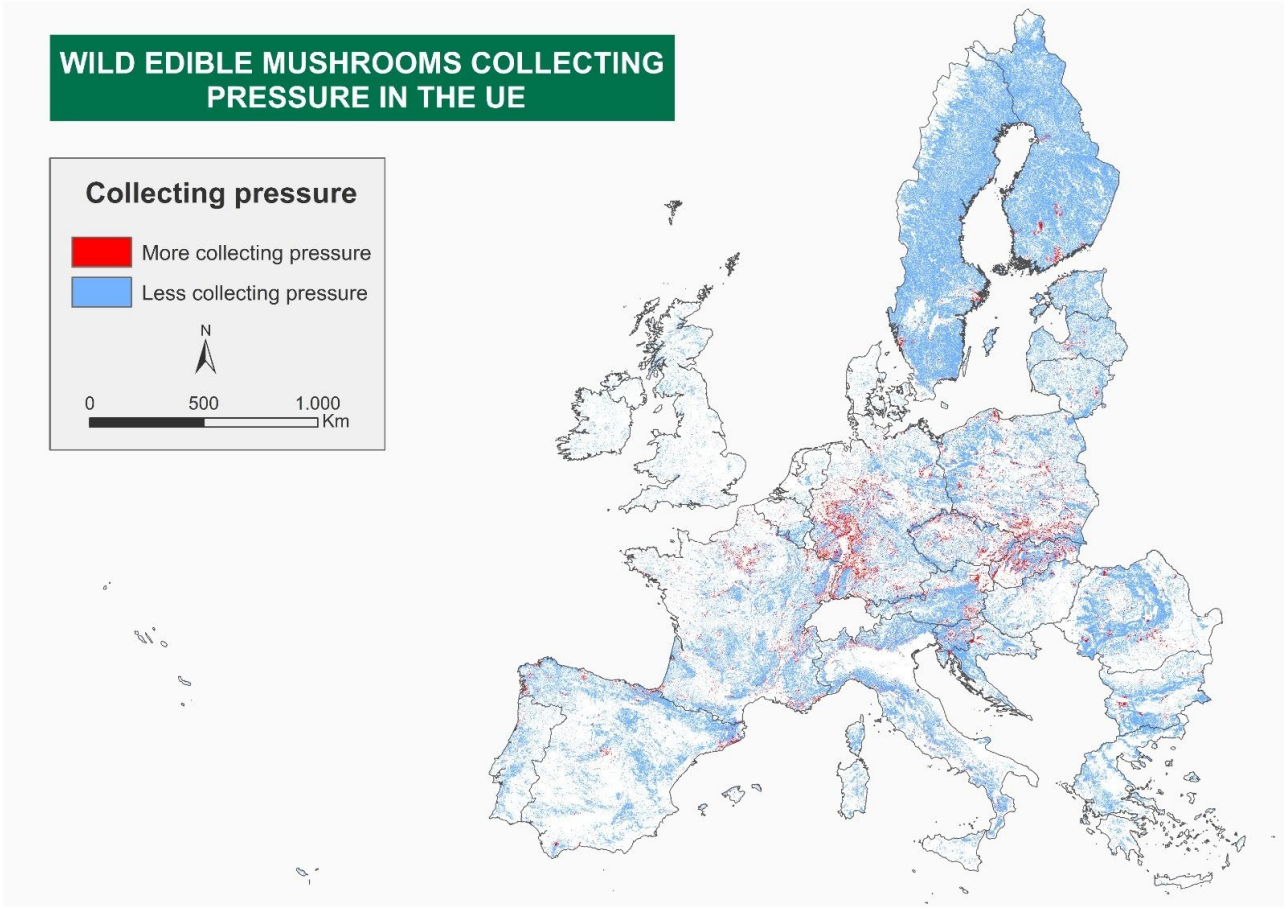


Indeed, mushroom productivity can be affected by climate change at different levels: phenological shifts, habitat replacements, changes in species composition, more variability in Mediterranean areas and an increase in the production linked to warming in cold areas. Modelling the consequences of climate change on fungal community and adapting forest taking into account the below-ground fungal connectivity must be considered.

Overharvesting?



Martínez-Peña et al. 2021 (in preparation)

Harvesting pressure in some areas with high rural population density or high mycotourism attractiveness may raise doubts about the long-term overexploitation of the resource. It is important to know the number of collectors and the quantities collected in the forests.

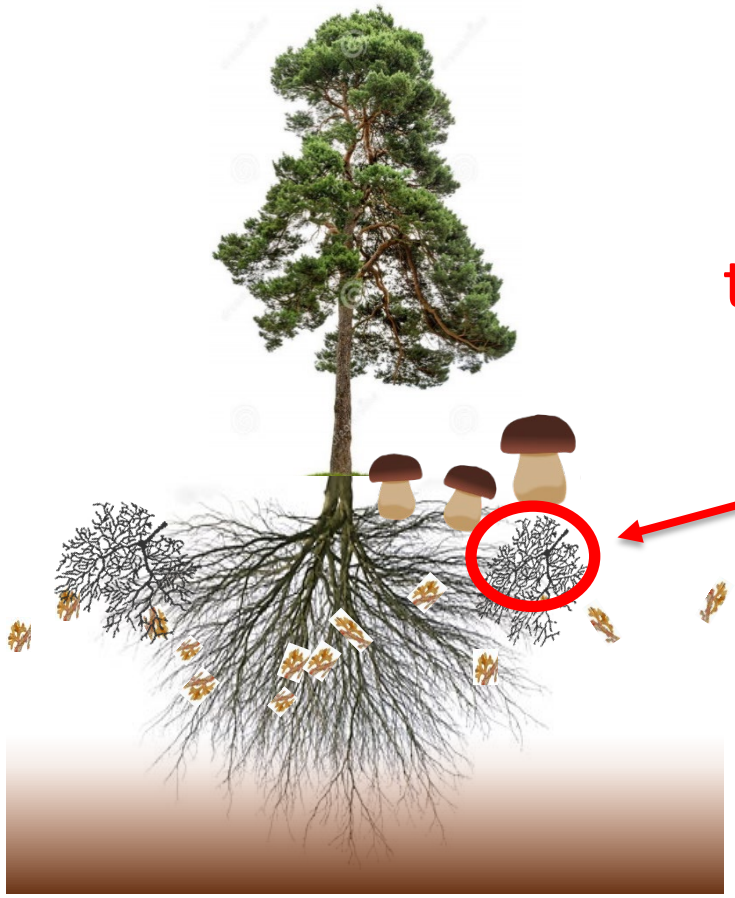
Integrating mycological resources in forest management is necessary

FUNGI FRIENDLY FOREST

Accordingly, to take advantage of all the opportunities that fungi can provide and mitigate threats, we encourage to integrate mycological resources into forest management. For this it is important to characterise production and harvesting in our forests.

Knowledge on the production of forest fungi is very scarce

Unfortunately ,information on wild edible mushroom production in European forest is still very scarce. There are some exceptions in Switzerland, Spain and Finland with long-term monitoring sites that have generated models useful for forest management. For this purpose, weekly sporocarp inventories based on permanent plots or transects have been used.



molecular genetic techniques

Extraction of soil cores

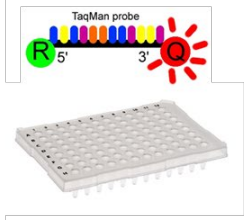
Every 2-3 months

Drying & sieving

Total DNA extraction

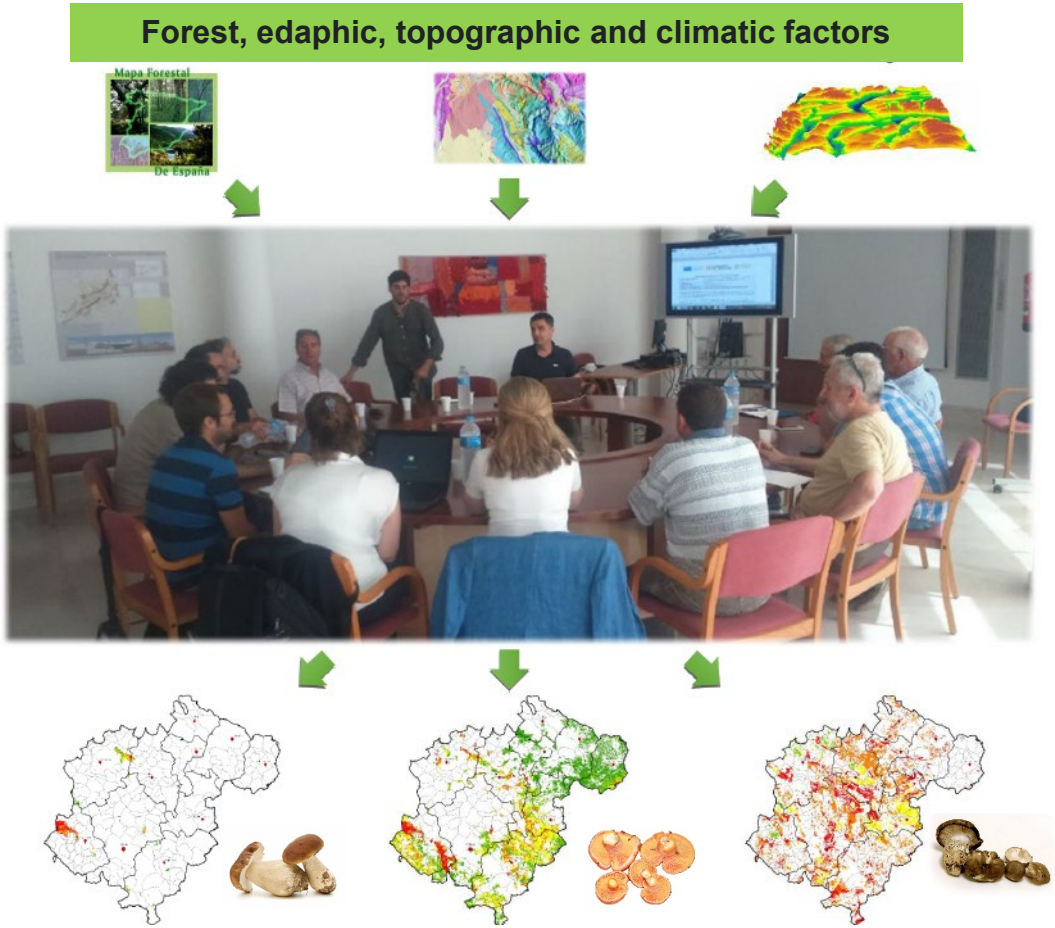
qPCR

Boletus edulis specific primers and probe



Absolute quantification

Due to the high costs associated with these long term sampling systems, other tools are being developed to detect and quantify fungal species based on molecular genetic techniques.



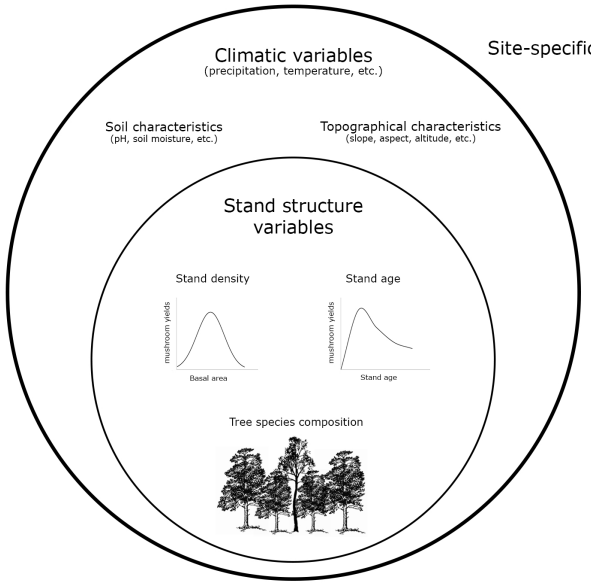
Regional mushroom potential production based on expert models

In addition, expert models are also being used, combining popular field knowledge with GIS tools. This methodology has been used to estimate the mycological potential in some regions such as Castilla y León or Aragón (Spain).

But to really know the rate of harvesting in the forests, we recommend to estimate the number and characteristics of mushroom collectors. Methodologies based on household surveys and mycotourists surveys have been used. This allows the estimation of harvesting pressure, harvesting yields and economic benefits for rural areas.

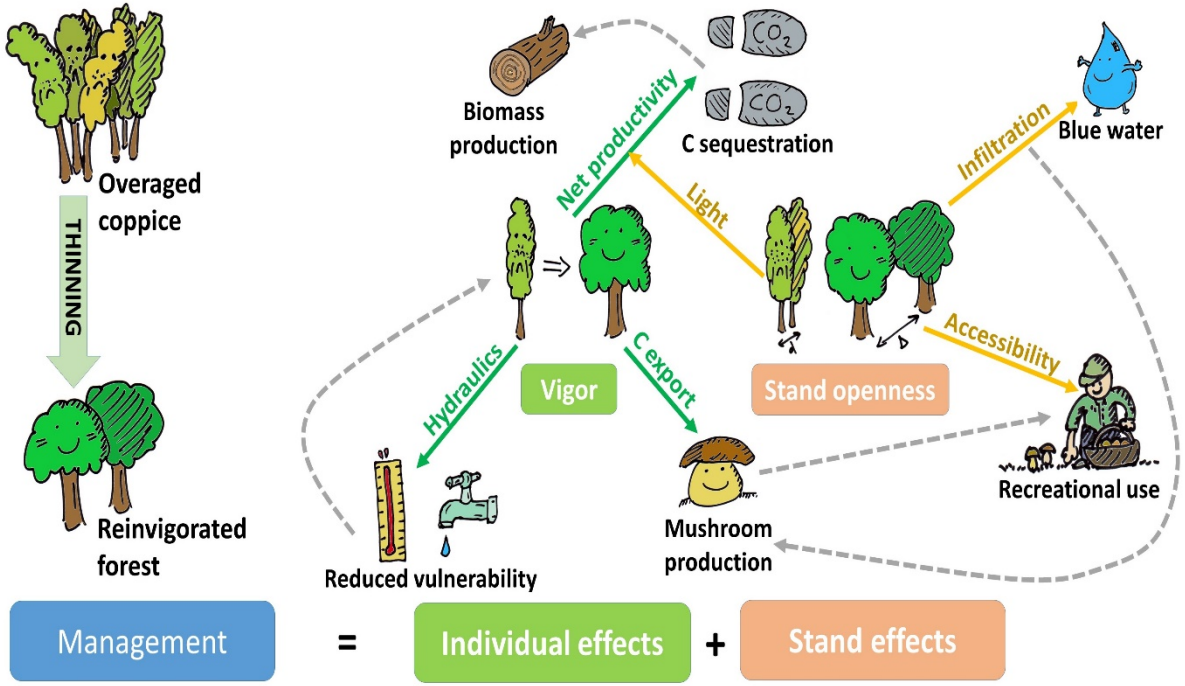
Some regions have developed harvesting permits using online systems. In this respect, new technologies and big data open up many opportunities to control harvesting sustainability.

Myco Silviculture



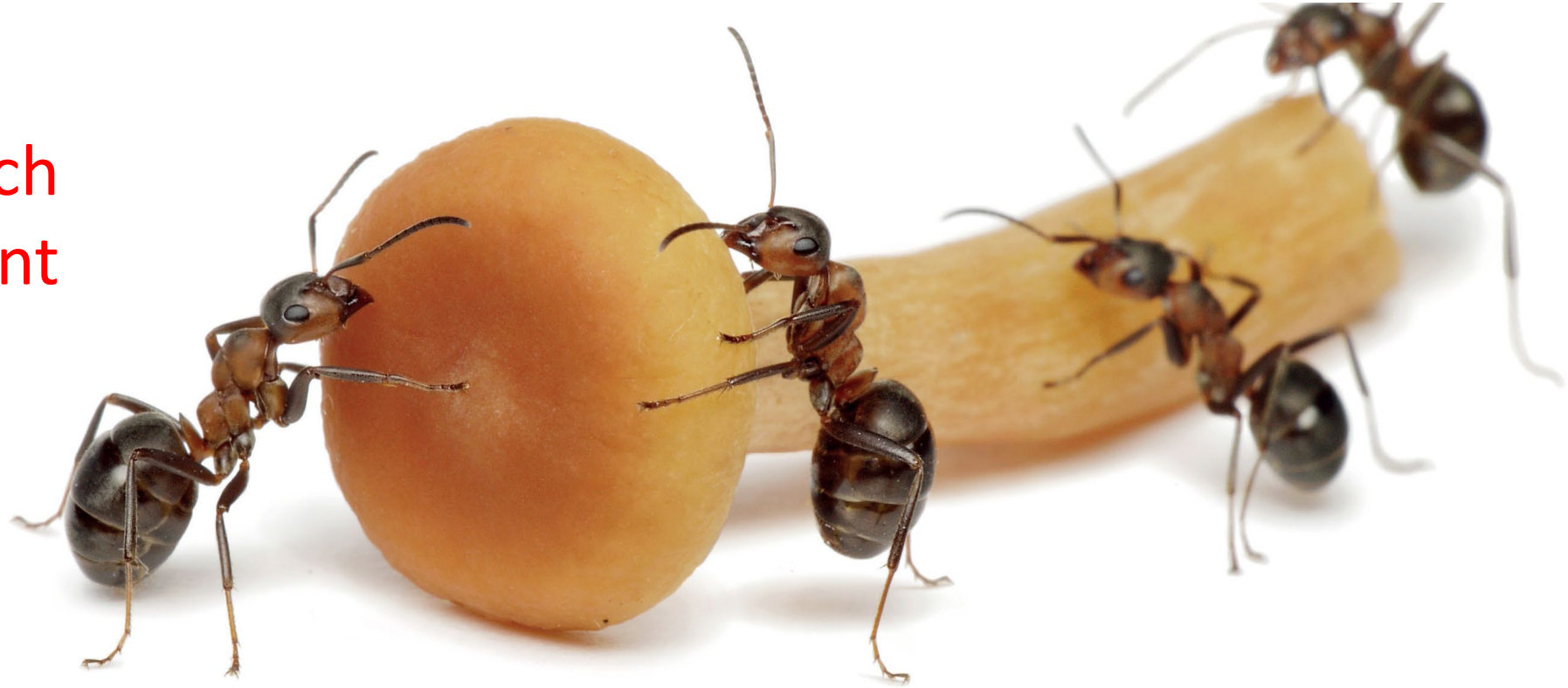
Tomao et al. 2017

Ferrio et al. 2020 COPICE Project



Another important tool for fungal production management is myco-silviculture. Silvicultural treatments make possible to optimise production and fungal diversity. We can also improve accessibility within picking areas and control the harvesting pressure.

How to approach the management of edible wild mushrooms?



But to develop sustainable management of mushrooms requires the collaboration of all stakeholders involved (forest owners&managers, harvesters, development agents, researchers, etc.). The exchange of good practices offered by European cooperation could be an opportunity for all interested territories.

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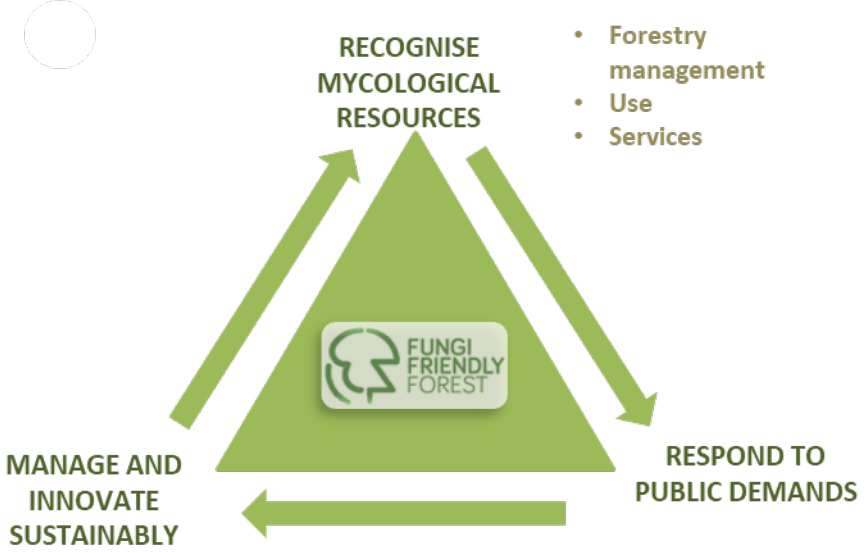

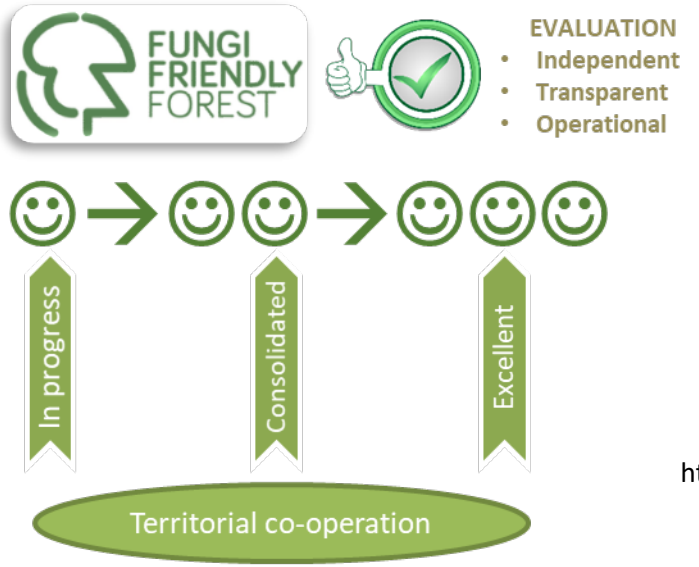

https://eumi.eu/fungi-friendly/

Objectives:
- Local economy
- Social development
- Adaptation of woodland to global change and biodiversity

Methodology:
- Multi-disciplinary combination (ecology, sociology, economy, management)
- Territorial approach
- Public-private co-operation
- International co-operation

In this regard, the EMI is a European grouping of territorial cooperation created with the aim of collaborating and exchanging good practices for the management and valorisation of wild edible mushrooms in Europe. We invite you to get to know our projects and to join us. Thank you for your attention

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Policy Forum: Untapping the potential of non-wood forest products for Europe's green economy
16-17 March. Online event

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Thank you!

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